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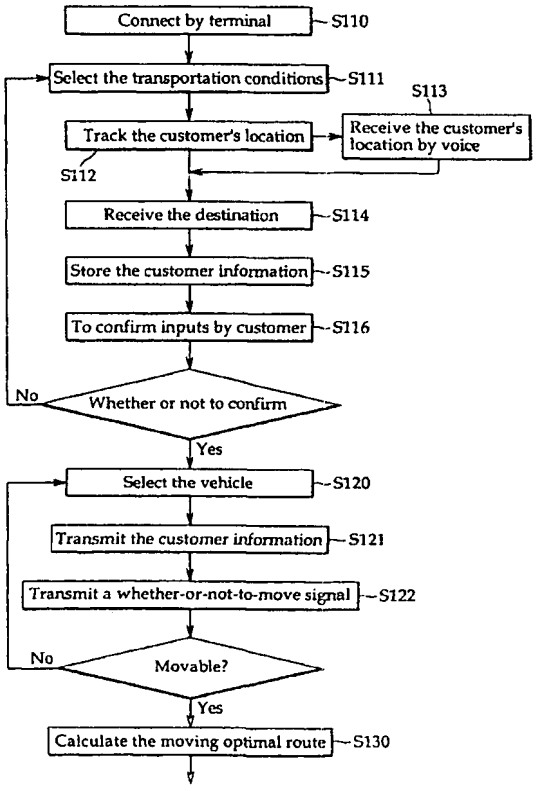
(54) Title: AUTOMATICALLY CALLING AND CONNECTING METHODS FOR TRANSPORTATION VEHICLES BY USING COMMUNICATION NETWORK AND VOICE RECOGNITION



(57) Abstract: Disclosed herein is the present invention relates generally to an automated transportation vehicle dispatching method of selecting an available vehicle at the customer's call and automatically connecting it to the customer, and more particularly to an automated transportation vehicle dispatching method, in which a customer can call a transportation vehicle through a communication network without personally ascertaining his position and informing a transportation vehicle call service provider about his position, and a central station ascertains a customer's position, enables the customer to cal an available vehicle closest to the customer's current position, provides the vehicle with the optimal route to his destination after receiving the destination, monitoring if the vehicle moves out of the transport route, and recognizes voice messages by means of the voice recognition device when receiving other information like the customer's destination, enabling all the processes of the vehicle dispatching service to be automated.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Automatically calling and connecting methods for transportation vehicles by using communication network and voice recognition

Technical Field

The present invention relates generally to an automated vehicle dispatching method of selecting an available transportation vehicle at a customer's request and of connecting it to him automatically, and more particularly to an automated vehicle dispatching method, in which, in order to request the transportation vehicle dispatch service provider to call a vehicle, the customer just connects to the central station of the dispatch service provider without ascertaining his own position and transmitting the location information, the central station tracks and ascertains automatically the customer's location, it chooses and dispatches an available vehicle closest to the customer's position, it receives the destination information along with it and offers the transportation vehicle the transport optimal route to the destination, it can monitor whether there occurs a breakaway from the way of the transport route, and it receives the customer's destination by voice and analyzes it by means of the voice recognition device, thus all the processes are automated.

Background Art

Services for connecting a customer to a vehicle through a phone call are disclosed in Korea Non-examined Patent Publication No. 2001-38106 (filed on 22nd, Oct, 1999). In this patent, the service operator can find out a customer's location by pinpointing their position within cells formed by his phone's originating position relative to nearby transmitters when he calls by his cellular phone, searches for available vehicles within the cell on the basis of the call's position, reports his phone number to one of them, and allows the customer to be connected to the corresponding vehicle.

However, the services have an advantage that a customer need not inform the operator of his location. But, it is disadvantageous in that the service operator has to call a driver and explain the customer's location to the driver, the driver should also phone to the customer by himself and find out the way to the customer's location only by his own experience, and the customer should wait for the car without being notified of any knowledge about the arrival time and the type of car, which makes the customer avoid using this kind of service.

And since any knowledge about the customer's destination is not received, the driver cannot consider whether to pick up or not on the basis of customer's destination. For example,

when the driver has to drive back to the company at the closing time, he would want to pick up a passenger whose direction is the same as that of his way back to the company. In this case, the driver could not have any consideration related to the direction, which hinders him from doing the effective and efficient dispatching operations.

Further, even if the customer's location can be automatically searched for as we know from the prior art above, the service operator has to manually receive and record the customer's voice messages about other information than the customer's location in order to forward it to the driver.

Disclosure of the Invention

Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the prior art, and an object of the present invention is to provide an automated vehicle dispatching method, in which the customer's current location is tracked automatically by means of the tracking function of the communication operator for the originating position of communication user terminal and the vehicle navigation system installed on transportation vehicles, and one of the available vehicles closest to customers is searched for and dispatched, and to provide the effective and efficient method improving the quality of the vehicle dispatching service and reducing the vehicle's wasteful operations.

More specifically, it is another object of the present invention to provide an automated transportation vehicle dispatching method, in which the driver is informed of the map information with a customer's current location and destination displayed on, so that he can make more deliberate decision of whether to yield to a customer's request and increase his operational efficiency.

Moreover, it is another object of the present invention to provide an automated transportation vehicle dispatching method, in which a customer's received voice messages are recognized and analyzed by means of the voice recognition device, in order to receive the additional information such as the destination information other than the location information and to communicate other information with a customer, so that customers can be offered an easy way of communication and the service operator can reduce personnel expenses.

And, it is another object of the present invention to provide an automated transportation vehicle dispatching method, in which the service operator calculates optimal routes from the current position to the destination on the base of various factors such as traffic conditions and offers them to the driver, and the service operator track continuously the vehicle's routs and

monitor its secession.

In order to accomplish these objects, there is provided an automated vehicle dispatching method comprising the steps of:

(a) the customer's communication user terminal connecting to the central station,

(b) the central station transmitting a selective list of all types of services and transportation conditions to said communication user terminal, and receiving selections of said service types and transportation conditions from said communication user terminal,

(c) the central station tracking the customer's current location by means of the customer's location tracking unit and producing the location information,

(d) if the customer's current location cannot be tracked out, the central station transmitting a message requesting for inputting the customer's current location to said communication user terminal, receiving the customer's current location by voice from said communication user terminal, and producing the location information by analyzing it by means of the voice recognition device,

(e) the central station transmitting a message requesting for inputting the customer's destination to said communication user terminal, receiving the customer's destination by voice from said communication user terminal, and producing the destination information by analyzing it by means of the voice recognition device,

(f) the central station storing said selected transportation conditions, said location information, and said destination information,

(g) the central station choosing an available transportation vehicle closest to the position of said location information,

(h) the central station transmitting said location information, said destination information, and a map information, with said location information displayed on, to the vehicle navigation system installed on the transportation vehicle, and transmitting a message asking whether or not to be able to reach the customer's location,

(i) the central station receiving the whether-or-not-to-move signal, and if a disapproval signal is entered, the step (g) being performed anew,

(j) if an approval signal is entered, the central station calculating and storing the moving optimal route and the expected arrival time for moving from the vehicle's current position to the customer's location,

(k) the central station transmitting said expected arrival time and the vehicle information about the transportation vehicle to said communication user terminal,

(l) the central station transmitting an order signal to move to the customer's location and said moving optimal route to said vehicle navigation system,

(m) the central station calculating the transport optimal route from the customer's location to his destination and, if a customer riding signal is received from the vehicle navigation system in the transportation vehicle, transmitting said transport optimal route to the vehicle navigation system, and

(n) the central station monitoring whether the transport route of the transportation vehicle is proceeding within a certain range from said transport optimal route.

Brief Description of the Drawings

The above and other objects, features and advantages of the present invention will be more apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a block diagram schematically illustrating a system according to an embodiment of the present invention;

FIG. 2 is a flow chart showing a process of an automated vehicle dispatching method by using the communication network and the voice recognition device according to the first embodiment of the present invention;

FIG. 3 is a flow chart showing a process of an automated vehicle dispatching method by using the communication network and the voice recognition device according to the second embodiment of the present invention;

FIG. 4 is a flow chart showing a process of an automated vehicle dispatching method by using the communication network and the voice recognition device according to the third embodiment of the present invention.

Best Mode for Carrying Out the Invention

Hereinafter, preferred embodiments of the present invention will be described with reference to the accompanying drawings. In the following description and drawings, the same reference numerals are used to designate the same or similar components, and so repetition of the description on the same or similar components will be omitted.

FIG. 1 is a block diagram schematically illustrating an automated vehicle dispatching system according to an embodiment of the present invention.

Referring to FIG. 1, the system according to an embodiment of the present invention is

composed of the communication user terminal 100, the vehicle navigation system installed on the transportation vehicle 301, and the central station 200.

The customer's communication user terminal 100 can be embodied in such all kinds of communication-enabled equipments as cellular phones of the CDMA mode or other modes, by which wireless communication or mobile internet service can be enabled, and as other communication-enabled devices which are connected to the wired communication networks.

The vehicle navigation system 301 installed on the transportation vehicle 300 has an equipment communicating data with the central station through the wireless networks, it transmits continuously to the central station the vehicle's current location detected by the car navigator and other vehicle operational information, produced by the operational recorder and the charging recorder of the vehicle's charging meter, and it receives the customer information or the map information with the customer's position displayed on and demonstrates them onto its display device.

As the above-mentioned car navigator has been already disclosed in Korean Non-examined Patent Publication Nos. 2001-26896 and 1999-6486, the car navigator can be implemented by means of the navigation method using satellites and the like, the self-standing navigation method in which its self-position can be identified with an angle sensor and a wheel sensor equipped at the vehicle, or the hybrid navigation method using together both the satellite navigation method and the self-standing method.

The central station 200 comprises, in more detail, the communication control device 201, the map information database 202, the customer's location tracking unit 203, the transportation vehicle information database 204, the central station microprocessor 205, and the voice recognition device 206.

The communication control device 201 transmits data to and receives data from the customer's communication user terminal 100 and the vehicle navigation system 301, and communicates traffic information with other satellites, bicorn, traffic broadcasting centers, and etc.

The map information database 202 stores the detailed map information about roads of the city where the vehicle runs around. And it is utilized for analyzing the traffic information and displaying the vehicle's current location and traffic jam degree onto the map, or calculating an optimal route, an expected transport time, and etc.

The customer's location tracking unit 203 searches for the customer's location by tracking the originating position from the communication user terminal 100 when being connected with the communication user terminal 100. In the case that the communication user terminal 100 is the

mobile communication equipment, the unit accesses the customer's information database in the mobile communication service company and acquire the customer's originating position. The customer's location tracking unit 203 can be made up by using the already-known technology of tracking the originating position from the mobile handset, as already showed in the Korean Non-examined Patent Publication Nos. 2001-42540 and 2001-46125. And more, in the case that the communication user terminal 100 is a wired telephone, the customer's location tracking unit connects with the customer's database in the wired network service companies and obtains the originating position by referring to the address where the wired phone is set up.

The transportation vehicle information database 204 stores and keeps the vehicle information about the transportation vehicles under the control of the central station 200, which has been inputted beforehand. And it receives continuously the vehicle's operational states such as whether the vehicle is vacant, whether it is available, whether it is engaged, and the like, and it stores and keeps them as the operational state information. Usually, the operational states are transmitted continuously at an interval of about 1 – 10 seconds. However, the practical interval can be changed in accordance with the operator's operational conditions. The vehicle information contains the type of the vehicle, the vehicle number, the vehicle's color, and etc. Additionally, the operational state information is transmitted continuously by the vehicle navigation system 301 in the transportation vehicle 300. The above-mentioned technology has been already disclosed in the Korean Non-examined Patent Publication Nos. 1999-82835 and 2000-66016.

The central station microprocessor 205 is a processor controlling and operating the central station 200. It has the built-in computer programs for an automated vehicle dispatching service, which operate and control overall functions of the central station 200. Specifically, some of those programs can calculate the optimal routes from the starting point to the destination and the expected transport time. By means of these programs, the processor can carry out its functions of producing optimal routes or expected transport times. They can be built up by means of usual programs such as service operation & control programs, the best-suited path calculation programs, and etc.

The voice recognition device 206 analyzes customer's voices and extracts information on the current position, the destination, or the transportation conditions. The voice recognition device 206 can be implemented by using usual voice recognition technologies.

FIG. 2 shows the flow of a process of an automated vehicle dispatching method by means of networks and the voice recognition device according to an embodiment of the present invention.

Referring to FIG. 2, first of all, the customer, who desires to use a transportation vehicle, connects to the central station 200 through a communication user terminal 100 at step S110. Usually, one or some of representative phone numbers are advertised and a customer calls one of them and connects to the central station 200. The communication user terminal 100 is either wired or wireless. More, it is also possible to be connected through the wired or wireless Internet. These various connection ways can be implemented by using already-known networking technologies.

When the customer connects to the central station 200, the central station 200 transmits selective questions about service types and transportation conditions to the communication user terminal 100, and receives selections from the communication user terminal 100 at the S111. Service types are taxi, delivery, quick delivery, driving agent, and the like. Transportation conditions contain the transportation type like call-van taxi, the transportation company, the vehicle size category like medium size, and the number of vehicles to be called.

After it receives the transportation conditions, the central station 200 searches for the customer's originating position by means of the customer's location tracking unit 203 and produces the location information at step S112. As shown above, in the case that the communication user terminal 100 is the mobile communication equipment, the unit accesses the customer's information database in the mobile communication service company and acquire the customer's calling position. And in the case that the communication user terminal 100 is a wired telephone, the tracking unit connects to the customer's database in the wired network service companies and obtain the calling position by referring to the address where the wired phone is set up. More, in the case that the customer connects through Internet, the unit tracks the location by using his current IP address.

However, if the originating position of the communication user terminal 100 cannot not identified, the central station 200 transmits a message requesting for inputting the customer's current location at step S113. At this time, the message that the central station 200 transmits to the communication user terminal 100 can be either of voice or of text. Hereinafter, all the messages that the central station 200 transmits to the communication user terminal 100 will be regarded as of voice or text. To put in briefly, the central station 200 transmits a request for the customer's current position to the communication user terminal 100, receives the customer's current position by voice, analyzes it by means of the voice recognition device 206, and produces the location information.

And in the same way, the central station 200 transmits a message requesting for the customer's destination to the communication user terminal 100, receives the customer's current

position by voice, analyzes it by means of the voice recognition device 206, and produces the destination at step S114.

The central station 200 stores above-mentioned selections of transportation conditions and the location information and the destination information at step S115.

After that, the central station 200 transmits to the communication user terminal 100 the message requesting for confirming all inputs by the customer, which includes the transportation conditions, the location information, and the destination information, and allows the customer to confirm all the inputs at step S116. If the customer sends a confirmative message to the central station 200, the following step is performed. Otherwise, the foremost step S111 of selecting the transportation condition should be performed anew.

In the next step, the central station 200 chooses a transportation vehicle 100 closest to the position of the above-mentioned location information at step S120. The central station 200 receives the vehicle's operational states, such as its current position and its vacancy, from the vehicle navigation system 301 in the transportation vehicle 300 continuously at a certain interval, and stores them in the transportation vehicle information database 204, so that the central station 200 can choose one of the closest vehicles on the base of this information.

After the transportation vehicle 300 is selected, the central station 200 transmits to the transportation vehicle 300's vehicle navigation system 301 the customer's location information and destination information and the map information on which the location information is displayed. More, along with such customer information, it transmits also a message asking whether or not to be able to reach the customer's location at step S121.

The map information, received from the central station 200, is displayed along with the customer's location information, indicating the customer's position, and his destination onto the display device of the vehicle navigation system 301, so that the vehicle driver can be informed in the visualized way. More, it is possible of this map information to be notified in other ways than visualized ways such as of voice or text, and so are the customer's location information and his destination information. Hereinafter, these ways can be applied to following embodiments related to displaying ways of the map information, the customer's location information, and his destination information.

The transportation vehicle's driver ascertains whether to be able to reach, considers overall conditions such as the current states of his vehicle, makes a decision over whether or not to reach the customer's location, and sends his decision to the central station 200 at step S122. Since the driver is informed of the customer's destination, he can consider whether his intended

destination is of the same direction as that of the customer.

However, if the transportation vehicle's driver concludes that it is impossible to move there, the disapproval signal is sent. In this case, the above-mentioned step S120 of selecting the transportation vehicle should be performed anew repeatedly until an available transportation vehicle 300 is found out.

When the approval signal is received from the transportation vehicle 300, the central station 200 calculates and stores the moving optimal route and the expected arrival time from the vehicle's current position to the customer's current location at step S130. And the central station 200 transmits the expected arrival time and the vehicle information about the transportation vehicle 300 to the customer's communication user terminal 100 at step S131. At this time, the transmitted information on vehicle contains such information, by which the customer can identify the vehicle called by himself, as its color, its vehicle number, and the driver's career, which have been registered beforehand as the vehicle information about transportation vehicles under control of the central station 200.

The customer, who receives the expected arrival time and the vehicle information on the called vehicle, decides whether or not he ride in and transmits the reconfirming message about riding to the central station 200 at step 132.

When the customer's intention of riding is reconfirmed, the central station 200 transmits an order signal to move to the customer's current location, and the moving optimal route from the vehicle's position to the customer's location to the vehicle navigation system 301 at step S133.

If the customer does not respond within a certain period of time (in the present invention, the certain period of time is defined as 30 seconds, however, it can be changed by the operator's request in consideration of operational conditions) or he sends a refusal signal to the central station 200, it transmits an order to stop moving and to wait for the next call, to the transportation vehicle 300 which has been ordered to move to the customer at step S134.

The central station 200 calculates and stores the transport optimal route from the customer's location to his destination, and if it receives from the vehicle navigation system 301 of the transportation vehicle 300 the signal indicating that the customer has ridden in, it transmits the transport optimal route to the vehicle navigation system 301 at step S140. To generate a signal indicating the customer's ride can be implemented in such way that the signal is generated when the vehicle's charging meter is turned on. The transport optimal route from the customer's location to the his destination, which is received via the vehicle navigation system 301, is showed up visually on the display device in the transportation vehicle 300, so that the vehicle driver can

easily find out the way to the destination even if it is strange to him.

Particularly, it can be implemented by using the already-disclosed technologies, and in order to enable the driver to move over the optimal route to the destination, the central station 200 transmits the map information and the traffic information such as road conditions, traffic states, and etc, displayed on the map, in real time in accordance with the current position of the vehicle, and makes them demonstrated on the display device of the vehicle navigation system 301 installed on the transportation vehicle 300. And the vehicle navigation system 301 receives them and shows them on the display device like monitors or delivers them by voice, which enables the driver to choose the optimal route and makes possible for customers to grasp the vehicle's current operational states by seeing what is displayed on the monitor. All of these can contribute towards earning higher customer's service satisfaction ratings. In the case that the messages are sent by voice or text, only essential spots on the map and traffic states are transmitted.

The central station 200 monitors continuously whether the transport route of the transportation vehicle 300 is proceeding within a certain range from the above-mentioned transport optimal route at step S150. The certain range can be defined usually as 100m, 300m, or 500m.

If the transport route gets out of the certain range from the transport optimal route, the central station 200 concludes that the vehicle is moving out of its transport route, and transmits to the customer's communication user terminal 100 a message asking whether or not his destination has been changed at step S151.

If the customer transmits a response that his destination has not been changed, the central station 200 newly calculates and stores the transport optimal route from the current position to the destination and the step S150 of monitoring the vehicle's transport route should be resumed at step S152.

If a message is received that the destination has been changed, the central station 200 would transmit a message requesting for inputting the changed destination onto the communication user terminal 100, receive the new destination by voice from the communication user terminal 100, analyzes it by the voice recognition device 206, produce the changed destination information, and calculate the transport optimal route from the current position to the new destination, and the step S150 of monitoring the transport route would be resumed at step S153.

However, if any message is not be received from the communication user terminal 100, the central station 200 would inform the police of the vehicle information about the transportation

vehicle 300, the customer information, the vehicle's current moving position, and the fact that the vehicle breaks away from the transport route, so that the police can be informed in advance that there is a possibility that the risk occurs at step S154. Further, if the customer has registered the connection point at the time that there is a possibility that the risk occurs, it can be provided as another way that the station calls at this connection point.

When the customer gets off the vehicle, the central station 200 stops monitoring the transportation route.

FIG. 3 shows the flow of a process of an automated vehicle dispatching method by means of networks and the voice recognition device according to the second embodiment of the present invention.

Referring to FIG. 3, as compared to the first embodiment of the present invention, the second embodiment is different only in regard to selecting the available transportation vehicle 300. In the first embodiment, the transportation vehicle is selected in such way that one of the closest available vehicle is selected, the selected vehicle is asked whether or not to move, and the next closest vehicle is selected if it fails. However, in the second embodiment, it is selected in such way that all the available vehicles within a certain search radius are selected, they are asked all at once whether or not to move, and one of the closest vehicles is selected among the transportation vehicles 300 which have responded an approval signal. The second embodiment has a disadvantage that the network's traffic volume increases but has an advantage that it takes a shorter period of time to select the transportation vehicle 300.

Since other steps than these above-mentioned steps of the second embodiment is the same as those of the first embodiment, the steps related to searching for and selecting available transportation vehicles 300 will be described in more detail and others will be mentioned briefly.

At first, the customer, who desires to use a transportation vehicle, connects to the central station 200 through a communication user terminal 100 at step S310. And the central station 200 transmits selective questions about service types and transportation conditions to the communication user terminal 100, and receives selections from the communication user terminal 100 at the S311.

And the central station 200 searches for the customer's originating position by means of the customer's location tracking unit 203 and produces the location information at step S312. However, if the originating position of the communication user terminal 100 cannot not identified, the central station 200 transmits a message requesting for inputting the customer's current location, receives a voice message telling the customer's current position, analyzes it by means of

the voice recognition device 206, and produces the location information at step S113. Further, the central station 200 transmits a message requesting for the customer's destination to the communication user terminal 100, receives the customer's current position by voice, analyzes it by means of the voice recognition device 206, and produces the destination information at step S314. And the central station 200 stores above-mentioned selections of transportation conditions and the location information and the destination information at step S315.

And more, the central station 200 transmits to the communication user terminal 100 the message requesting for confirming all inputs by the customer, which includes the transportation conditions, the location information, and the destination information, and allows the customer to confirm all the inputs at step S316. If the customer sends a confirmative message to the central station 200, the following step is performed. Otherwise, the foremost step S311 of selecting the transportation condition is performed anew.

After that, the central station 200 searches for all the available transportation vehicles 100 within a certain search radius from the center of the customer's location at step S320. The certain radius can be defined as 1km, 3km, or 5km, and changed by the service's operator. Or, it can choose a certain number of vehicles (in the present invention, the certain number of vehicles is defined as 5, but it can be also changed by the operator), which are waiting most closest to the customer's location, among those searched available transportation vehicles 100. After that, the central station 200 transmits to the vehicle navigation system 301 of all searched transportation vehicle 300 the customer's location information, destination information, and the map information on which the location information is displayed, and it transmits also a message asking whether or not to be able to reach the customer's location at step S321. And the central station 200 receives the whether-or-not-to-move signals from vehicle navigation systems 301. If it does not receive any approval signal, the above-mentioned step S320 of searching for the transportation vehicle should be performed anew with a broader search radius at step S322.

However, if the central station 200 receives an approval signal from at least one transportation vehicle 300, it chooses one of the closest vehicles to the customer's current location among the approving vehicles, calculates and stores the moving optimal route and the expected arrival time from the selected transportation vehicle 300's location to the customer's location at step S330. And it transmits an order to wait to the vehicle navigation systems 301 of other non-selected transportation vehicles 300. Further, the central station 200 transmits the expected arrival time and the vehicle information about the transportation vehicle 300 to the customer's communication user terminal 100 at step S331. The customer, who receives the expected arrival

time and the vehicle information on the called vehicle, decides whether or not he rides in and transmits the reconfirming message about riding to the central station 200 at step 332. When the customer's intention of riding is reconfirmed, the central station 200 transmits an order signal to move to the customer's current location, and the moving optimal route from the vehicle's position to the customer's location to the vehicle navigation system 301 at step S333.

The central station 200 calculates and stores the transport optimal route from the customer's location to his destination, and if it receives from the vehicle navigation system 301 of the transportation vehicle 300 the signal indicating that the customer has ridden in, it transmits the transport optimal route to the vehicle navigation system 301 at step S340.

The central station 200 monitors continuously whether the transport route of the transportation vehicle 300 is proceeding within a certain range from the above-mentioned transport optimal route at step S350.

FIG. 4 shows the flow of a process of an automated vehicle dispatching method by means of networks and the voice recognition device according to the third embodiment of the present invention.

Referring to FIG. 4, as compared to the second embodiment of the present invention, the third embodiment is different only in regard to selecting the transportation vehicle 300 which will move to the customer. In the second embodiment, the movable vehicle is selected in such way that, among all the movable vehicles, which are searched for within a certain range, selected is a transportation vehicle closest to the customer's location and an order signal to move to the customer is transmitted to it. However, in the third embodiment, the movable vehicle is selected in such way that the list of all the movable transportation vehicles, which are searched for within a certain range, is transmitted to the customer's communication user terminal 100, the customer selects one of those vehicles among vehicles in the list, and an order signal to move to the customer is transmitted to it. The third embodiment has a disadvantage that it takes a longer period of time to select the movable transportation vehicle 300, but it has an advantage that its service quality can be improved by giving the customer chances to select.

Since other steps than these steps of the third embodiment is the same as those of the second embodiment, the steps related to searching and selecting the movable transportation vehicle 300 will be described in more detail and others will be mentioned briefly.

At first, the customer, who desires to use a transportation vehicle, connects to the central station 200 through a communication user terminal 100 at step S510. And the central station 200 transmits selective questions about service types and transportation conditions to the

communication user terminal 100, and receives selections from the communication user terminal 100 at the S511.

And the central station 200 searches for the customer's originating position by means of the customer's location tracking unit 203 and produces the location information at step S512. However, if the originating position of the communication user terminal 100 cannot not identified, the central station 200 transmits a message requesting for inputting the customer's current location, receives a voice message telling the customer's current position, analyzes it by means of the voice recognition device 206, and produces the location information at step S113. Further, the central station 200 transmits a message requesting for the customer's destination to the communication user terminal 100, receives the customer's current position by voice, analyzes it by means of the voice recognition device 206, and produces the destination information at step S514. And the central station 200 stores above-mentioned selections of transportation conditions and the location information and the destination information at step S515.

And more, the central station 200 transmits to the communication user terminal 100 the message requesting for confirming all inputs by the customer, which includes the transportation conditions, the location information, and the destination information, and allows the customer to confirm all the inputs at step S516. If the customer sends a confirmative message to the central station 200, the following step is performed. Otherwise, the foremost step S511 of selecting the transportation condition should be performed anew.

After that, the central station 200 searches for all the available transportation vehicles 100 within a certain search radius from the center of the customer's location at step S520. The certain radius can be defined as 1km, 3km, or 5km, and changed by the service's operator. Or, it can choose a certain number of vehicles (in the present invention, the certain number of vehicles is defined as 5, but it can be also changed by the operator), which are waiting most closest to the customer's location, among those searched available transportation vehicles 100. After that, the central station 200 transmits to the vehicle navigation system 301 of all searched transportation vehicle 300 the customer's location information, destination information, and the map information on which the location information is displayed, and it transmits also a message asking whether or not to be able to reach the customer's location at step S521. And the central station 200 receives the whether-or-not-to-move signals from vehicle navigation systems 301. If it does not receive any approval signal, the above-mentioned step S520 of searching for the transportation vehicle should be performed anew with a broader search radius at step S522.

However, if the central station 200 receives an approval signal from at least one

transportation vehicle 300, for each transportation vehicle 300 which respond an approval, the central station 200 calculates and stores its moving optimal route and its expected arrival time from the vehicle's location to the customer's location at step S530. After that, the central station 200 transmits to the customer's communication user terminal 100 the list of the movable transportation vehicles 300 with their expected arrival times and their vehicle information at step S531. The customer selects what he desires among the transportation vehicles 300 in the list, and transmits his selection to the central station 200 at step S532. The customer can select what he desires, in the consideration of the vehicle information such as the vehicle type and the vehicle's color, the expected moving time, and the like.

And the central station 200 transmits an order signal to wait to the vehicle navigation systems 301 of other non-selected transportation vehicles 300, and it transmits to the vehicle navigation systems 301 of the selected transportation vehicles 300 an order signal to move to the customer with the above transport optimal route at step 533.

The central station 200 calculates and stores the transport optimal route from the customer's location to his destination, and if it receives from the vehicle navigation system 301 of the transportation vehicle 300 the signal indicating that the customer has ridden in, it transmits the transport optimal route to the vehicle navigation system 301 at step S540. And, the central station 200 monitors continuously whether the transport route of the transportation vehicle 300 is proceeding within a certain range from the above-mentioned transport optimal route at step S550.

As described above, the present invention provides the automated vehicle dispatching method, in which the customer's location is automatically tracked by means of the communication company's tracking function for communication terminals and the vehicle navigation system installed on the transportation vehicle, and one of the closest available vehicles to the customer's location, which are satisfying the customer's requirements and exists within a certain range, is automatically searched for and connected to the customer, so that it can improve qualities of the vehicle dispatching service using communication terminals and also efficiencies of the transportation vehicle's operation by reducing the vehicle's unnecessary movements.

More, the present invention provides the automated vehicle dispatching method, in which the vehicle driver is offered with the map information, on which the customer's location information is displayed, and the destination information, and is allowed to determine whether or not to accept the customer's call and to move to the customer, in consideration of more information, so that the vehicle driver can operate his vehicle more efficiently. And the vehicle driver is provided and supported with optimal routes, which are calculated by the service provider,

using the customer's starting location and his destination, on the base of various factors such as the traffic conditions, so that even if the driver is a novice, it can provides the stable and best quality of service.

Further, when additional information other than the customer's current location such as the customer's destination information is received and the customer is communicated for other objects, the customer's voice messages are analyzed by means of the voice recognition device, so that the method provides the customer with the most comfortable way of communication and enables the service provider to reduce the personnel cost by automation.

Finally, by using the information about customer's starting position and his destination, it can be monitored continuously whether the transportation vehicle moves out of the transport route, so that the method can prevent the prospected crimes related to vehicles and provide high quality of services by assuring the safety of customers like women easily exposed to such risks.

Although preferred embodiments of the present invention have been described as limited to the field of the transportation vehicle, they can be applied in the field of other transport services by means of the network such as a goods transport service, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. A method of dispatching transportation vehicles automatically by means of the central station 200, which communicates with the vehicle navigation system 301 of a transportation vehicle and the communication user terminal 100, and receives the vehicle's location information and operational states information continuously at a certain interval from said vehicle navigation system 301, and which comprises the customer's location tracking unit 203 for tracking the originating location of the communication user terminal 100, and the voice recognition device 206 for recognizing and analyzing voice messages, the automated transportation vehicle dispatching method comprising the steps of:

(S110) the customer's communication user terminal connecting to the central station,

(S111) the central station transmitting a selective list of all types of services and transportation conditions to said communication user terminal, and receiving selections of said service types and transportation conditions from said communication user terminal,

(S112) the central station tracking the customer's current location by means of the customer's location tracking unit and producing the location information,

(S113) if the customer's current location cannot be tracked out, the central station transmitting a message requesting for inputting the customer's current location to said communication user terminal, receiving the customer's current location by voice from said communication user terminal, and producing the location information by analyzing it by means of the voice recognition device,

(S114) the central station transmitting a message requesting for inputting the customer's destination to said communication user terminal, receiving the customer's destination by voice from said communication user terminal, and producing the destination information by analyzing it by means of the voice recognition device,

(S115) the central station storing said selected transportation conditions, said location information, and said destination information,

(S120) the central station choosing an available transportation vehicle closest to the position of said location information,

(S121) the central station transmitting said location information, said destination information, and a map information, with said location information displayed on, to the vehicle navigation system installed on the transportation vehicle, and transmitting a message asking whether or not to be able to move to the customer's location,

(S122) the central station receiving the whether-or-not-to-move signal, and if a disapproval signal is entered, the step S120 being performed,

(S130) if an approval signal is entered, the central station calculating and storing the moving optimal route and the expected arrival time for moving from the vehicle's current location to the customer's location,

(S131) the central station transmitting said expected arrival time and the vehicle information about the transportation vehicle to said communication user terminal,

(S133) the central station transmitting an order signal to move to the customer's location and said moving optimal route to said vehicle navigation system,

(S140) the central station calculating the transport optimal route from the customer's location to his destination and, if a customer riding signal is received from the vehicle navigation system in the transportation vehicle, transmitting said transport optimal route to the vehicle navigation system, and

(S150) the central station monitoring whether the transport route of the transportation vehicle is proceeding within a certain range from said transport optimal route.

2. The method of dispatching transportation vehicles automatically as claimed in claim 1, further comprising the steps, after the step S150, of:

(S151) if said transport route gets out of the certain range from the transport optimal route, the central station transmitting to the customer's communication user terminal a message asking whether or not his destination has been changed,

(S152) if the customer transmits a response that his destination has not been changed, the central station calculating and storing the transport optimal route from the current position to the destination and the step S150 getting resumed,

(S153) if a message is received that the destination has been changed, the central station transmitting a message requesting for inputting the changed destination onto the communication user terminal, receiving the new destination by voice from the communication user terminal, analyzing it by means of the voice recognition device, producing the changed destination information, and calculating the transport optimal route from the current position to the new destination, and the step S150 being resumed, and

(S154) if any message is not be received from the communication user terminal, the central station informing the police of the vehicle information about the transportation vehicle, the customer information, the vehicle's current moving position, and the fact that the vehicle breaks

away from the transport route.

3. The method of dispatching transportation vehicles automatically as claimed in claim 1, further comprising the steps, after the step S115, of:

(S116) the central station transmitting to the communication user terminal the message requesting for confirming all inputs, which includes the transportation conditions, the location information, and the destination information, and

(S117) if the customer sends a confirmative message to the central station, the following step being performed, and otherwise, the step S111 being performed.

4. A method of dispatching transportation vehicles automatically by means of the central station 200, which communicates with the vehicle navigation system 301 of a transportation vehicle and the communication user terminal 100, and receives the vehicle's location information and operational states information continuously at a certain interval from said vehicle navigation system 301, and which comprises the customer's location tracking unit 203 for tracking the originating location of the communication user terminal 100, and the voice recognition device 206 for recognizing and analyzing voice messages, the automated transportation vehicle dispatching method comprising the steps of:

(S310) the customer's communication user terminal connecting to the central station,

(S311) the central station transmitting a selective list of all types of services and transportation conditions to said communication user terminal, and receiving selections of said service types and transportation conditions from said communication user terminal,

(S312) the central station tracking the customer's current location by means of the customer's location tracking unit and producing the location information,

(S313) if the customer's current location cannot be tracked out, the central station transmitting a message requesting for inputting the customer's current location to said communication user terminal, receiving the customer's current location by voice from said communication user terminal, and producing the location information by analyzing it by means of the voice recognition device,

(S314) the central station transmitting a message requesting for inputting the customer's destination to said communication user terminal, receiving the customer's destination by voice from said communication user terminal, and producing the destination information by analyzing it by means of the voice recognition device,

(S320) the central station searching for all the available transportation vehicles 100 within a certain search radius from the center of the customer's location,

(S321) the central station transmitting to the vehicle navigation system of all searched transportation vehicle 300 the customer's location information, destination information, and the map information on which the location information is displayed, and transmitting also a message asking whether or not to be able to move to the customer's location,

(S322) the central station 200 receiving the whether-or-not-to-move signals from vehicle navigation systems, and if it does not receive any approval signal, the step S320 being performed with a broader search radius,

(S330) if the central station receives an approval signal from at least one transportation vehicle, the central station choosing one of the closest vehicles to the customer's current location among the approving vehicles, and calculating and storing the moving optimal route and the expected arrival time from the selected vehicle's location to the customer's location,

(S331) the central station 200 transmitting said expected arrival time and the vehicle information about the transportation vehicle to said communication user terminal,

(S333) the central station transmitting to the vehicle navigation system an order signal to move to the customer's current location, and said moving optimal route from the vehicle's position to the customer's location,

(S340) the central station's calculating the best-suited path from the customer's current location to his destination and, if a signal is received that the customer rides on said vehicle, transmitting said best-suited path to said vehicle navigation system 301, and

(S350) the central station's monitoring whether said vehicle moves within some fixed ranges from said best-suited path.

5. The method of dispatching transportation vehicles automatically as claimed in claim 4, further comprising the steps, after the step S350, of:

(S351) if said transport route gets out of the certain range from the transport optimal route, the central station transmitting to the customer's communication user terminal a message asking whether or not his destination has been changed,

(S352) if the customer transmits a response that his destination has not been changed, the central station calculating and storing the transport optimal route from the current position to the destination and the step S350 getting resumed,

(S353) if a message is received that the destination has been changed, the central station

transmitting a message requesting for inputting the changed destination onto the communication user terminal, receiving the new destination by voice from the communication user terminal, analyzing it by the voice recognition device, producing the changed destination information, and calculating the transport optimal route from the current position to the new destination, and the step S350 being resumed, and

(S354) if any message is not be received from the communication user terminal, the central station informing the police of the vehicle information about the transportation vehicle, the customer information, the vehicle's current moving position, and the fact that the vehicle breaks away from the transport route.

6. A method of dispatching transportation vehicles automatically by means of the central station 200, which communicates with the vehicle navigation system 301 of a transportation vehicle and the communication user terminal 100, and receives the vehicle's location information and operational states information continuously at a certain interval from said vehicle navigation system 301, and which comprises the customer's location tracking unit 203 for tracking the originating location of the communication user terminal 100, and the voice recognition device 206 for recognizing and analyzing voice messages, the automated transportation vehicle dispatching method comprising the steps of:

(S510) the customer's communication user terminal connecting to the central station,

(S511) the central station transmitting a selective list of all types of services and transportation conditions to said communication user terminal, and receiving selections of said service types and transportation conditions from said communication user terminal,

(S512) the central station tracking the customer's current location by means of the customer's location tracking unit and producing the location information,

(S513) if the customer's current location cannot be tracked out, the central station transmitting a message requesting for inputting the customer's current location to said communication user terminal, receiving the customer's current location by voice from said communication user terminal, and producing the location information by analyzing it by means of the voice recognition device,

(S514) the central station transmitting a message requesting for inputting the customer's destination to said communication user terminal, receiving the customer's destination by voice from said communication user terminal, and producing the destination information by analyzing it by means of the voice recognition device,

(S520) the central station searching for all the available transportation vehicles 100 within a certain search radius from the center of the customer's location,

(S521) the central station transmitting to the vehicle navigation system of all searched transportation vehicle 300 the customer's location information, destination information, and the map information on which the location information is displayed, and transmitting also a message asking whether or not to be able to move to the customer's location,

(S522) the central station 200 receiving the whether-or-not-to-move signals from vehicle navigation systems, and if it does not receive any approval signal, the step S520 being performed with a broader search radius,

(S530) if the central station receives an approval signal from at least one transportation vehicle 300, for each transportation vehicle which respond an approval, the central station calculating and storing its moving optimal route and its expected arrival time from the vehicle's location to the customer's location,

(S531) the central station transmitting to the customer's communication user terminal the list of the movable transportation vehicles with their expected arrival times and their vehicle information,

(S532) the communication user terminal transmitting to the central station what the customer selects among the transportation vehicles in the list, and transmits his selection to the central station,

(S533) the central station transmitting to the vehicle navigation system an order signal to move to the customer's current location, and said moving optimal route from the vehicle's position to the customer's location,

(S540) the central station's calculating the best-suited path from the customer's current location to his destination and, if a signal is received that the customer rides on said vehicle, transmitting said best-suited path to said vehicle navigation system 301, and

(S550) the central station's monitoring whether said vehicle moves within some fixed ranges from said best-suited path.

7. The method of dispatching transportation vehicles automatically as claimed in claim 6, further comprising the steps, after the step S550, of:

(S551) if said transport route gets out of the certain range from the transport optimal route, the central station transmitting to the customer's communication user terminal a message asking whether or not his destination has been changed,

(S552) if the customer transmits a response that his destination has not been changed, the central station newly calculating and storing the transport optimal route from the current position to the destination and the step S550 getting resumed,

(S553) if a message is received that the destination has been changed, the central station transmitting a message requesting for inputting the changed destination onto the communication user terminal, receiving the new destination by voice from the communication user terminal, analyzing it by means of the voice recognition device, producing the changed destination information, and calculating the transport optimal route from the current position to the new destination, and the step S550 being resumed, and

(S554) if any message is not be received from the communication user terminal, the central station informing the police of the vehicle information about the transportation vehicle, the customer information, the vehicle's current moving position, and the fact that the vehicle breaks away from the transport route.

FIG. 1

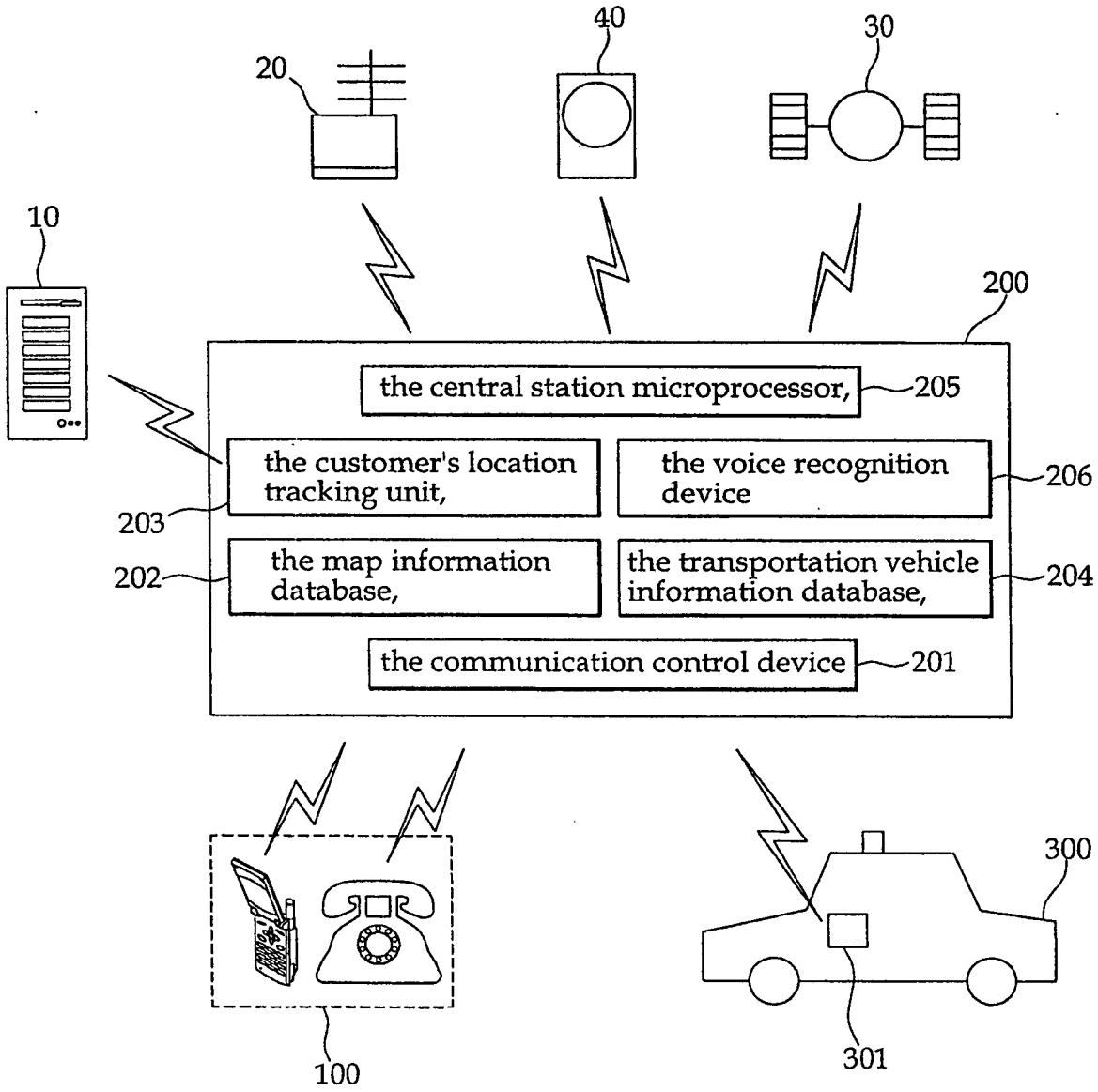

40
30
20
10
200
the central station microprocessor,
205
the customer's location tracking unit,
the voice recognition device
206
203
202
the map information database,
the transportation vehicle information database,
204
the communication control device
201
300
100
301

FIG. 2A

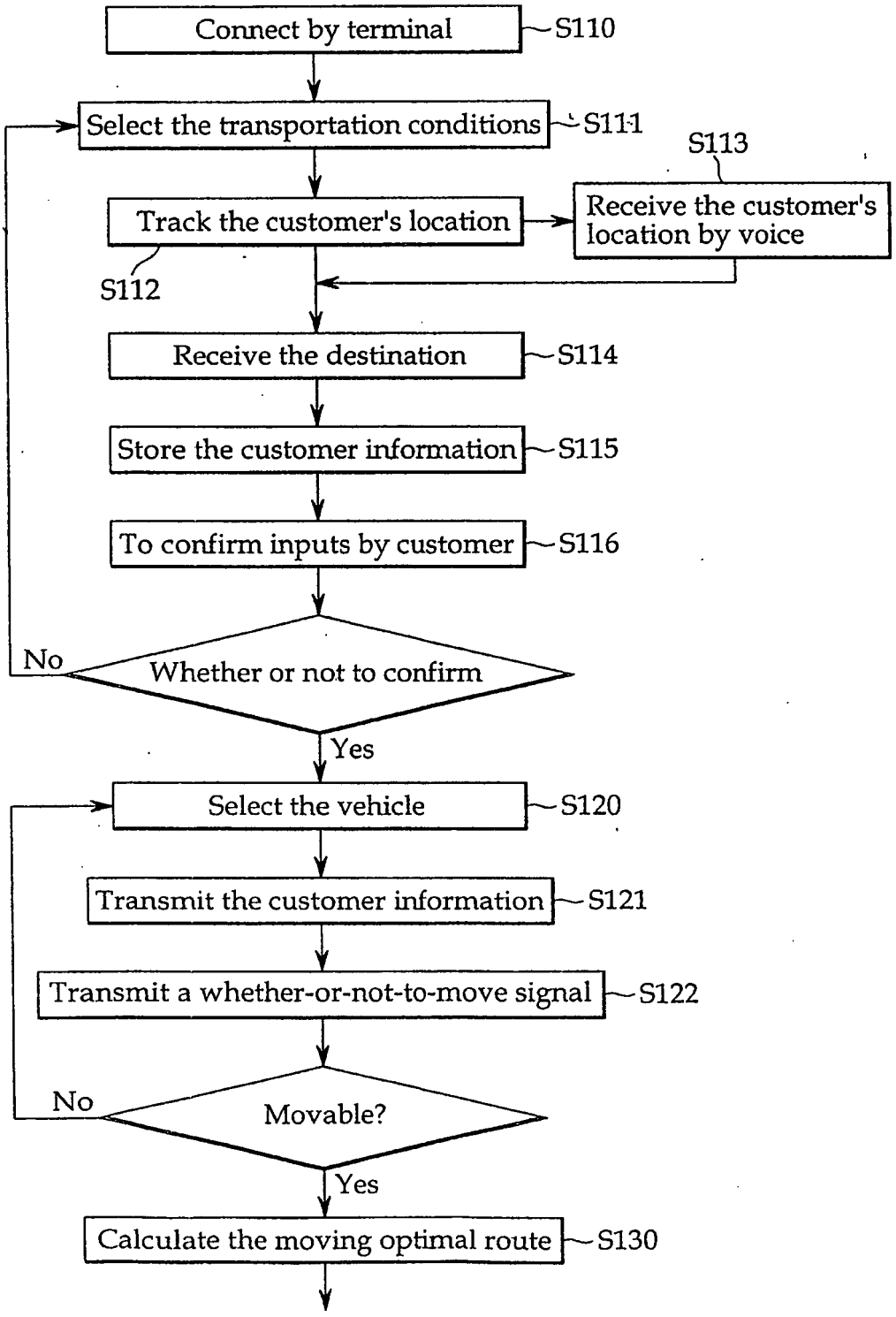

Connect by terminal
S110
Select the transportation conditions
S111
S113
Track the customer's location
Receive the customer's location by voice
S112
Receive the destination
S114
Store the customer information
S115
To confirm inputs by customer
S116
No
Whether or not to confirm
Yes
Select the vehicle
S120
Transmit the customer information
S121
Transmit a whether-or-not-to-move signal
S122
No
Movable?
Yes
Calculate the moving optimal route
S130

FIG. 2B

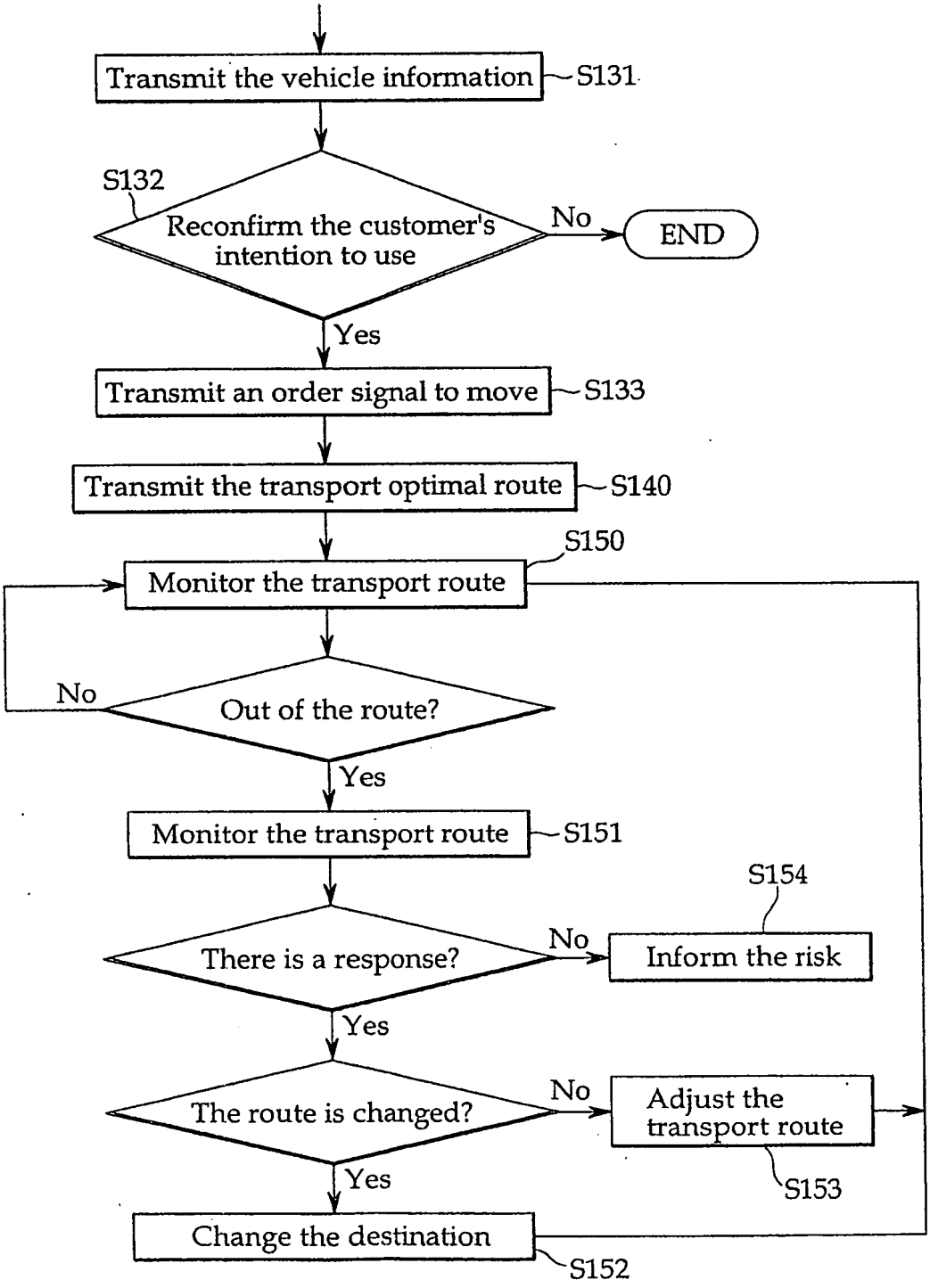

Transmit the vehicle information
S131
S132
Reconfirm the customer's intention to use
No
END
Yes
Transmit an order signal to move
S133
Transmit the transport optimal route
S140
S150
Monitor the transport route
No
Out of the route?
Yes
Monitor the transport route
S151
S154
There is a response?
No
Inform the risk
Yes
The route is changed?
No
Adjust the transport route
S153
Yes
Change the destination
S152

FIG. 3A

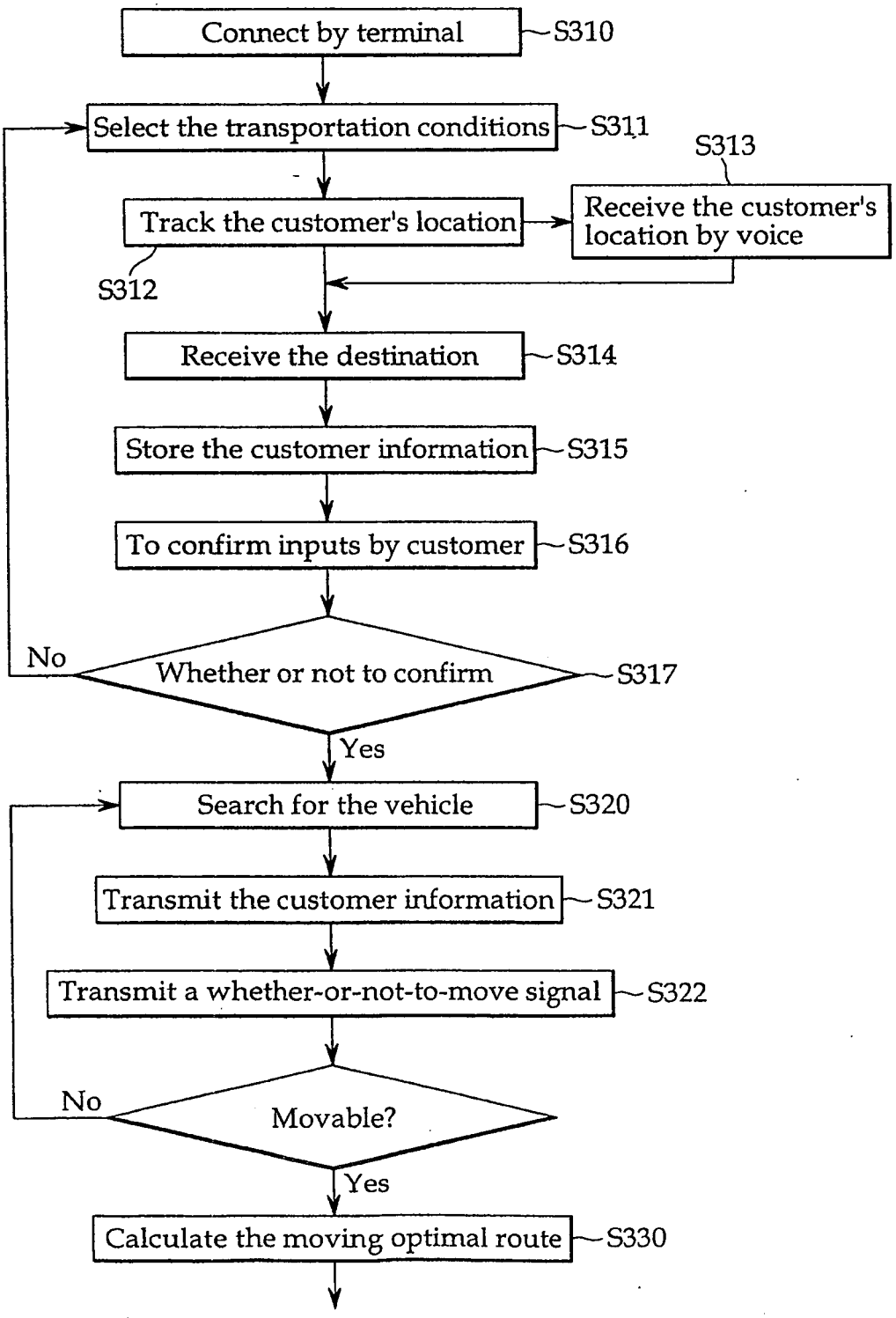

Connect by terminal
S310
Select the transportation conditions
S311
S313
Track the customer's location
Receive the customer's location by voice
S312
Receive the destination
S314
Store the customer information
S315
To confirm inputs by customer
S316
No
Whether or not to confirm
S317
Yes
Search for the vehicle
S320
Transmit the customer information
S321
Transmit a whether-or-not-to-move signal
S322
No
Movable?
Yes
Calculate the moving optimal route
S330

FIG. 3B

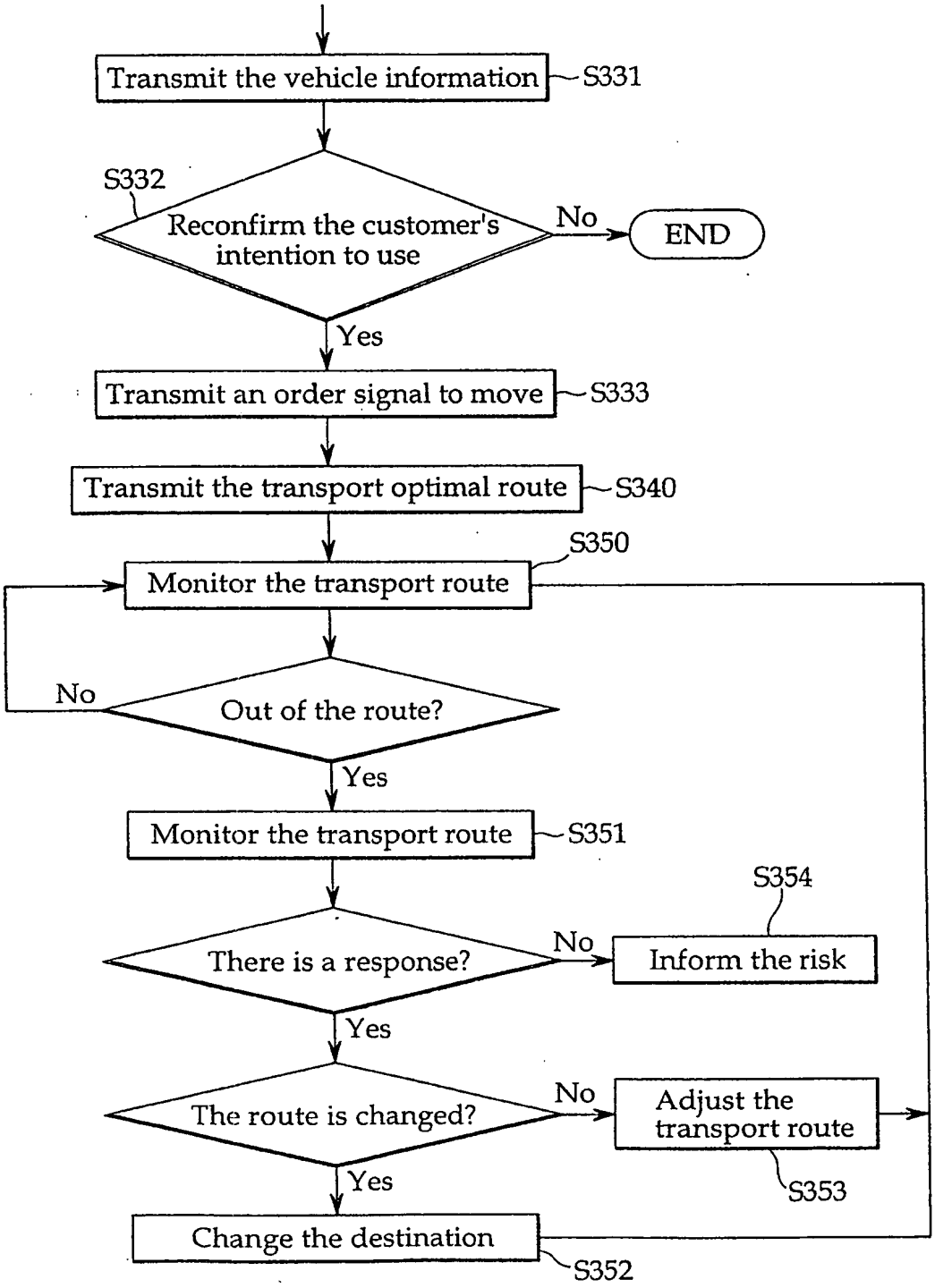

Transmit the vehicle information
S331
S332
Reconfirm the customer's intention to use
No
END
Yes
Transmit an order signal to move
S333
Transmit the transport optimal route
S340
S350
Monitor the transport route
No
Out of the route?
Yes
Monitor the transport route
S351
S354
There is a response?
No
Inform the risk
Yes
The route is changed?
No
Adjust the transport route
S353
Yes
Change the destination
S352

FIG. 4A

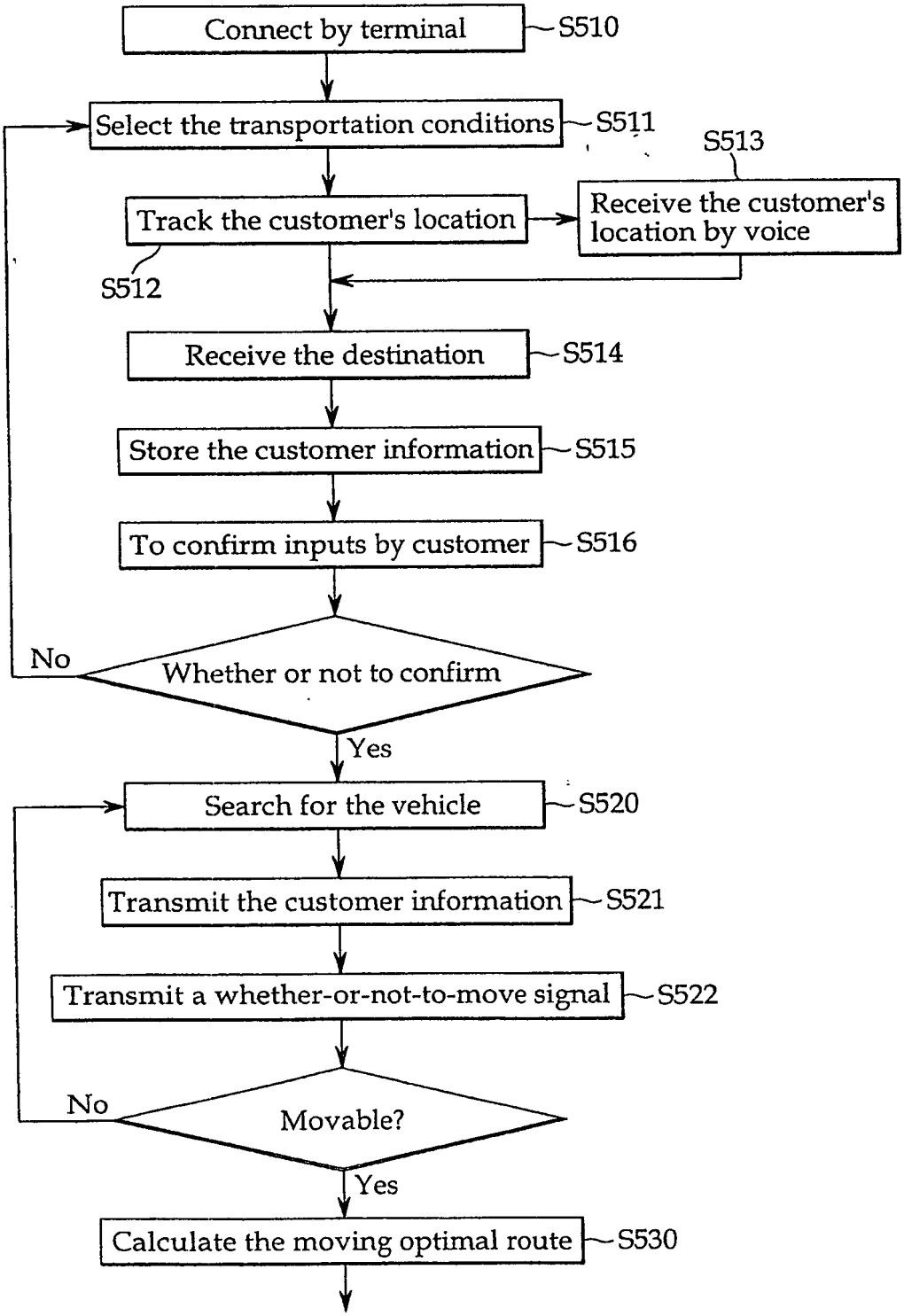
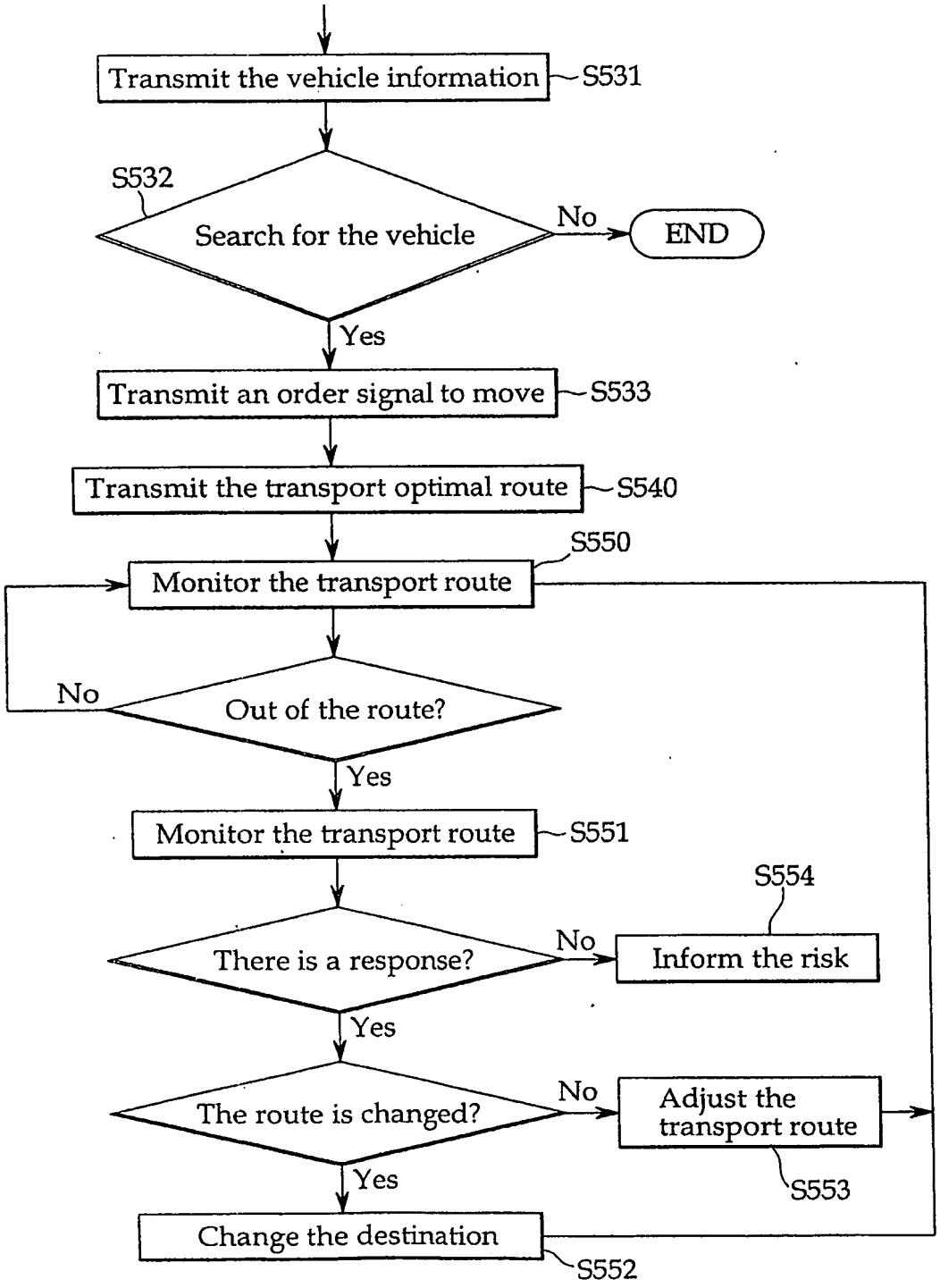

Connect by terminal
S510
Select the transportation conditions
S511
S513
Track the customer's location
Receive the customer's location by voice
S512
Receive the destination
S514
Store the customer information
S515
To confirm inputs by customer
S516
No
Whether or not to confirm
Yes
Search for the vehicle
S520
Transmit the customer information
S521
Transmit a whether-or-not-to-move signal
S522
No
Movable?
Yes
Calculate the moving optimal route
S530

FIG. 4B


Transmit the vehicle information
S531
S532
Search for the vehicle
No
END
Yes
Transmit an order signal to move
S533
Transmit the transport optimal route
S540
S550
Monitor the transport route
No
Out of the route?
Yes
Monitor the transport route
S551
S554
There is a response?
No
Inform the risk
Yes
The route is changed?
No
Adjust the transport route
S553
Yes
Change the destination
S552

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR03/01381

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 H04Q 7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC7 H04Q 7/38

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Patents and applications for inventions since 1975
Korean Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPASS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2002-163775 A (NEC INFRONTIA CO.) 07. 06. 2002 - figure 2, paragraph 7 - paragraph 13, abstract	1 - 7
A	KR 2001-0082477 A (LEE, JAE-WOOK) 30. 08. 2001 - figure 1 - figure 6, description, abstract	1 - 7
A	KR 2000-0072555 A (LEE, KWANG-JIN) 05. 12. 2000 - figure 3, description, abstract	1 - 7

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 OCTOBER 2003 (29.10.2003)	29 OCTOBER 2003 (29.10.2003)

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
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Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
MIN, Boung Joon
Telephone No. 82-42-481-5746

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR03/01381

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2002-163775 A	07. 06. 2002	NONE	
KR 2001-0082477 A	30. 08. 2001	NONE	
KR 2000-0072555 A	05. 12. 2000	NONE	